BEFORE THE
PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2017-3-E

In the Matter of Annual Review of Base Rates for Fuel Costs for Duke Energy Carolinas, LLC.	))))	**DIRECT TESTIMONY OF** **SCOTT L. BATSON FOR** **DUKE ENERGY CAROLINAS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Scott L. Batson and my business address is 526 South Church Street, Charlotte, North Carolina.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am Senior Vice President of Nuclear Operations for Duke Energy Corporation ("Duke Energy") with direct executive accountability for Duke Energy's South Carolina nuclear plants, including Duke Energy Carolinas, LLC's ("DEC" or the "Company") Catawba Nuclear Station ("Catawba") in York County, South Carolina, the Oconee Nuclear Station ("Oconee") in Oconee County, South Carolina, and Duke Energy Progress, LLC's ("DEP") Robinson Nuclear Plant, located in Darlington County, South Carolina.

Q. WHAT ARE YOUR RESPONSIBILITIES AS SENIOR VICE PRESIDENT OF NUCLEAR OPERATIONS?

A. As Senior Vice President of Nuclear Operations, I am responsible for providing executive oversight for the safe and reliable operation of Duke Energy's three South Carolina operating nuclear stations. I am also involved in the operations of Duke Energy's other nuclear stations, including DEC's McGuire Nuclear Station ("McGuire") located in Mecklenburg County, North Carolina.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I have a Bachelor's degree in Mechanical Engineering from Clemson University. I am a registered professional engineer in South Carolina, and held a senior reactor operator license from the U.S. Nuclear Regulatory Commission ("NRC"). My

career began at DEC (formerly known as Duke Power Company) in 1985 as a junior engineer at Oconee. I held various leadership positions at Oconee in operations, maintenance, and engineering before being named plant manager. In 2012, I was named plant manager at Catawba, and I returned to Oconee in 2013 as site vice president. I assumed my current role as Senior Vice President of Nuclear Operations in 2016.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to describe and discuss the performance of DEC's nuclear fleet during the period of June 1, 2016 through May 31, 2017 (the "review period").

Q. YOUR TESTIMONY INCLUDES THREE EXHIBITS. WERE THESE EXHIBITS PREPARED BY YOU OR AT YOUR DIRECTION AND UNDER YOUR SUPERVISION?

A. Yes. These exhibits were prepared at my direction and under my supervision.

Q. PLEASE PROVIDE A DESCRIPTION OF THE EXHIBITS.

A. The exhibits and descriptions are as follows:

Batson Exhibit 1 - Calculation of the nuclear capacity factor for the review period pursuant to S.C. Code § 58-27-865

Batson Exhibit 2 - Nuclear outage data for the review period

Batson Exhibit 3 - Nuclear outage data through the billing period [1]

[1] This data is provided in confidential and publicly redacted versions for security purposes

Q. PLEASE DESCRIBE DEC'S NUCLEAR GENERATION PORTFOLIO.

A. The Company's nuclear generation portfolio consists of approximately 5,389[2] megawatts ("MWs") of generating capacity, made up as follows:

Oconee -	2,554 MWs
McGuire -	2,316 MWs
Catawba -	519 MWs[3]

Q. PLEASE PROVIDE A GENERAL DESCRIPTION OF DEC'S NUCLEAR GENERATION ASSETS.

A. The Company's nuclear fleet consists of three generating stations and a total of seven units. Oconee began commercial operation in 1973 and was the first nuclear station designed, built, and operated by DEC. It has the distinction of being the second nuclear station in the country to have its license, originally issued for 40 years, renewed for up to an additional 20 years by the NRC. The license renewal, which was obtained in 2000, extends operations to 2033, 2033, and 2034 for Oconee Units 1, 2, and 3 respectively.

McGuire began commercial operation in 1981 and Catawba began commercial operation in 1985. In 2003, the NRC renewed the licenses for McGuire and Catawba for up to an additional 20 years each. This renewal extends operations until 2041 for McGuire Unit 1, and 2043 for McGuire Unit 2 and Catawba Units 1 and 2. The Company jointly owns Catawba with North Carolina Municipal Power Agency Number One, North Carolina Electric Membership Corporation, and Piedmont Municipal Power Agency.

[2] Based on Net Maximum Dependable Capacity as of January 1, 2017
[3] Reflects DEC's 19.2 percent ownership of Catawba Nuclear Station

Q. WHAT ARE DEC'S OBJECTIVES IN THE OPERATION OF ITS NUCLEAR GENERATION ASSETS?

A. The primary objective of DEC's nuclear generation department is to safely provide reliable and cost-effective electricity to DEC's Carolinas customers. The Company achieves this objective by focusing on a number of key areas. Operations personnel and other station employees are well-trained and execute their responsibilities to the highest standards in accordance with detailed procedures. The Company maintains station equipment and systems reliably, and ensures timely implementation of work plans and projects that enhance the performance of systems, equipment, and personnel. Station refueling and maintenance outages are conducted through the execution of well-planned, well-executed, and high quality work activities, which effectively ready the plant for operation until the next planned outage.

Q. PLEASE DISCUSS THE PERFORMANCE OF DEC'S NUCLEAR FLEET DURING THE REVIEW PERIOD.

A. The Company operated its nuclear stations in a reasonable and prudent manner during the review period, providing 61 percent of the total energy generated by DEC. The seven nuclear units operated at an actual system average capacity factor of 95.97 percent for the review period which included four refueling outages.

As shown on Batson Exhibit 1, DEC achieved a net nuclear capacity factor, excluding reasonable outage time, of 101.51 percent for the review period. This capacity factor is above the 92.5 percent set forth in S.C. Code § 58-27-865(F), which states in pertinent part:

> There shall be a rebuttable presumption that an electrical utility made every reasonable effort to minimize cost associated with the

> operation of its nuclear generation facility or system, as applicable, if the utility achieved a net capacity factor of ninety-two and one-half percent or higher during the period under review. The calculation of the net capacity factor shall exclude reasonable outage time associated with reasonable refueling, reasonable maintenance, reasonable repair, and reasonable equipment replacement outages; the reasonable reduced power generation experienced by nuclear units as they approach a refueling outage; the reasonable reduced power generation experienced by nuclear units associated with bringing a unit back to full power after an outage....

The performance results discussed above support DEC's continued commitment for achieving high performance without compromising safety and reliability.

Q. HOW DOES DEC'S NUCLEAR FLEET COMPARE TO INDUSTRY AVERAGES?

A. The Company's nuclear fleet has a history of top quartile performance. Industry data for 2016 ranked Duke Energy's nuclear fleet favorably, either in first or second place, when compared to the seven other large domestic nuclear fleets using Key Performance Indicators ("KPIs") in the areas of personal safety, radiological dose, manual and automatic shutdowns, capacity factor, forced loss rate, Institute of Nuclear Power Operations performance index, and total operating cost. On a larger industry basis using data for 2016 from Electric Utility Cost Group, both McGuire and Catawba ranked in the top quartile in total operating cost among the 60 U.S. nuclear stations reporting. Oconee, in 18th position, placed in the upper second quartile. Industry benchmarking efforts and industry excellence initiatives are the principal technique used by the Company to ensure best practices. These efforts further ensure overall prudence, safety, and reliability of DEC's nuclear units.

Additionally, for 17 consecutive years DEC's nuclear plants have surpassed a 90 percent annual capacity factor threshold. As a result of this strong operational performance, the Company has produced approximately 32 million MWHs of additional generation, which is equivalent to an additional 6.8 months of output (based on DEC's average annual generation for the same 17-year period). These performance results support DEC's continued commitment to achieving high performance without compromising safety and reliability.

Q. WHAT IMPACTS A UNIT'S AVAILABILITY AND WHAT IS DEC'S PHILOSOPHY FOR SCHEDULING REFUELING AND MAINTENANCE OUTAGES?

A. In general, refueling requirements, maintenance requirements, prudent maintenance practices, and NRC operating requirements impact the availability of DEC's nuclear system. Prior to a planned outage, DEC develops a detailed schedule for the outage and for major tasks to be performed including sub-schedules for particular activities.

The Company's scheduling philosophy is to plan for a best possible outcome for each outage activity within the outage plan. For example, if the "best ever" time an outage task was performed is 10 days, then 10 days or less becomes the goal for that task in each subsequent outage. Those individual goals are incorporated into an overall outage schedule. The Company aggressively works to meet, and measures itself against, that schedule. Further, to minimize potential impacts to outage schedules, "discovery activities" (walk-downs, inspections, etc.) are scheduled at the earliest opportunities so that any maintenance or repairs identified through those activities can be promptly incorporated into the outage plan.

As noted, the schedule is utilized for measuring outage planning and execution, and driving continuous improvement efforts. However, in order to provide reasonable, rather than best ever, total outage time for planning purposes, particularly with the dispatch and system operating center functions, DEC also develops an allocation of outage time which incorporates unforeseen schedule delays that may be needed for unplanned equipment repairs found during inspections. The development of each outage allocation is dependent on maintenance and repair activities included in the outage, as well as major projects to be implemented during the outage. Both schedule and allocation are set aggressively to drive continuous improvement in outage planning and execution.

Q. HOW DOES DEC HANDLE OUTAGE EXTENSIONS AND FORCED OUTAGES?

A. When an outage extension becomes necessary, DEC expects that work completed in the extension results in longer continuous run times and fewer forced outages, thereby reducing overall fuel costs in the long run. Therefore, if an unanticipated issue that has the potential to become an on-line reliability issue is discovered while a unit is off-line for a scheduled outage and repair cannot be completed within the planned work window, the outage may be extended for the minimum time needed to perform necessary maintenance or repairs prior to returning the unit to service. In the event that a unit is forced off-line, every effort is made to perform the repair and return the unit to service as quickly as possible.

Q. DOES DEC PERFORM POST-OUTAGE CRITIQUES AND CAUSE ANALYSES FOR INTERNAL IMPROVEMENT EFFORTS?

A. Yes. The nuclear industry recognizes that constant focus on operational excellence results in improved nuclear safety and reliability. As such, DEC applies self-critical analysis to each outage to identify every potential cause of an outage delay or event resulting in a forced or extended outage. These critiques evaluate the performance of each function and discipline involved in both outage planning and execution. Lessons learned are applied to drive continuous improvement. These critiques and cause analyses do not document the broader context of the outage or event, and thus rarely reflect strengths and successes.

Q. WHAT IS THE RELATIONSHIP BETWEEN THE STANDARDS THAT THE COMPANY APPLIES IN ITS POST OUTAGE CRITIQUES AND THE "EVERY REASONABLE EFFORT" STANDARD OF SECTION 58-27-865?

In our outage evaluations we are looking closely for any opportunity for improvement. We are not assessing the "reasonableness" of any conduct or actions that might have contributed to the outage. Reasonableness focuses on what was done in light of what was known prior to the event; in our outage evaluations we are focused on learning and applying new lessons from our experiences in order to improve our operations.

Q. WHAT OUTAGES WERE REQUIRED FOR REFUELING AT DEC'S NUCLEAR FACILITIES DURING THE REVIEW PERIOD?

A. There were four refueling outages during the review period; fall 2016 outages at Catawba Unit 2 and Oconee Unit 1, followed by spring 2017 outages at McGuire

Unit 2 and Catawba Unit 1. All four refueling and maintenance outages were completed under budget and within the scheduled allocation.

After completing a record 523 day continuous cycle run, Catawba Unit 2 was removed from service for maintenance and refueling on September 10, 2016. In addition to refueling activities, major work included a "rotor out" inspection of the main generator and inspection of the 2A low pressure turbine. Eddy current testing and sludge lancing was completed on all four steam generators. Diesel generator work included the rebuild of the 2A battery charger and modification of the 2A governor. Work on large pumps and motors included the replacement of the 2B2 component cooling pump and motor, 2C hotwell pump and motor, 2B condensate booster pump motor, 2C1 and 2C2 heater drain pump motors, 2B reactor coolant pump motor, and 2A residual heat removal pump and motor. The outage successfully concluded 3 days under the scheduled allocation and $3.8M under budget.

Oconee Unit 1 entered the refueling and maintenance outage on November 4, 2016. In addition to refueling activities, significant maintenance activities were completed during the outage. Work completed included eddy current testing on all tubes in both steam generators with tube plugging and stabilization where required. Preventative maintenance was completed on the 3C low pressure turbine and the 1A2 feedwater heater and the 1B2 reactor coolant pump motor were replaced. The Amertap condenser tube cleaning system was replaced with an upgraded system improving both efficiency and reliability of this key function. All modifications required to meet the NRC's current post-Fukushima orders were completed on Unit

1. The outage was completed approximately 12 days ahead of the scheduled allocation; the 22.4 day duration of this outage established a new outage duration record for the station. Outage O&M expenses were $8.2M below budget.

On March 30, 2017, McGuire Unit 2 was removed from the grid and began a refueling and maintenance outage. Inspections were completed on the 2A low pressure turbine and other turbine work included valve and actuator replacement for 2 turbine stop valves, 2 governor valves, 3 reheat and intercept valves, and 3 reheat stop valves. U-tube eddy current testing and secondary sludge lancing was performed on all four steam generators. The 2B reactor coolant pump motor was replaced with an upgraded motor containing a more robust stator. Other reliability enhancements and upgrades completed included the replacement of the 2A chemical and volume pump rotating assembly and replacement of the 2A emergency diesel generator voltage regulator. The outage concluded in 23.8 days against a scheduled allocation of 26 days; establishing a new outage duration record for the unit. O&M expenditures for the outage totaled $28.5M compared to the target of $30.1M.

The Catawba Unit 1 outage that began on April 29, 2017 was the last maintenance and refueling outage conducted during the review period. In addition to refueling during the scheduled shutdown, inspections were completed on the 1A low pressure turbine and a main generator hydrogen seal repair was completed. Large pump and motor work included the replacement of the 1B stator cooling pump, 1C1 heater drain pump motor, 1C condensate booster pump motor, and the 1B chemical and volume control pump motor. Emergency diesel generator upgrades included the 1B governor modification and the rebuild of 1B battery

charger. Outage activities completed in 24.2 days against a scheduled allocation of 29 days with a total O&M cost of $28.9M compared to the outage O&M budget of $30.3M.

Q. OTHER THAN REFUELING, WHAT OUTAGES OCCURRED AT DEC'S NUCLEAR FACILITIES DURING THE REVIEW PERIOD?

There was a planned maintenance outage on Oconee Unit 1 and a forced outage on McGuire Unit 2 during the review period.

Oconee Unit 1 entered a planned maintenance outage on February 18, 2017 to repair a reactor coolant pump ("RCP") seal leak. After Unit 1 returned to service following the fall 2016 fall refueling outage, indications of seal leakage and degradation on the 1B2 RCP seal were observed. A maintenance outage was planned and scheduled to replace the seal. The seal was replaced and the unit returned to service on February 25, 2017.

Following an investigation of increased reactor coolant system ("RCS") leakage, McGuire Unit 2 was removed from service on February 24, 2017 to repair a small leak on the 2D cold leg safety injection line. A structural weld overlay was applied to the leaking portion of the line and thermocouple monitoring was installed to facilitate observations of thermal characteristics at power. During inspections prior to start-up, a separate issue involving a small pinhole leak in a spray bypass valve was identified. The valve was replaced and the unit returned to service on March 8, 2017.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.

DUKE ENERGY CAROLINAS, LLC
SOUTH CAROLINA ANNUAL REVIEW OF BASE RATES FOR FUEL COSTS
NUCLEAR CAPACITY FACTOR PURSUANT TO S.C. CODE ANN. § 58-27-865(F)
REVIEW PERIOD OF JUNE 2016 THROUGH MAY 2017

1	Nuclear System Actual Net Generation During Review Period	60,260,600	MWH
2	Total Number of Hours during Review Period	8,760	
3	Nuclear System MDC during Review Period	7,168	MW
4	Reasonable Nuclear System Reductions	3,431,092	MWH
5	Nuclear System Capacity Factor ((L1/(L2a*L3a)-L4)*100	101.51	%

DUKE ENERGY CAROLINAS, LLC
SOUTH CAROLINA ANNUAL REVIEW OF BASE RATES FOR FUEL COSTS
NUCLEAR OUTAGE DATA FOR REVIEW PERIOD OF
June 2016 THROUGH MAY 2017

Nuclear outages lasting one week or more during the Review Period

Station/Unit	Date of Outage	Explanation of Outage
Catawba 2	9/10/2016 - 10/9/2016	Scheduled Refueling - EOC 21
Oconee 1	11/4/2016 - 11/27/2016	Scheduled Refueling - EOC 29
Oconee 1	2/18/2017 - 2/25/2016	Scheduled Maintenance Outage
McGuire 2	2/24/2017 - 3/8/2017	Forced Maintenance Outage
McGuire 2	3/30/2017 - 4/22/2017	Scheduled Refueling - EOC 24
Catawba 1	4/29/2017 - 5/23/2017	Scheduled Refueling - EOC 23

PUBLIC
Batson Exhibit 3

DUKE ENERGY CAROLINAS, LLC
SOUTH CAROLINA ANNUAL REVIEW OF BASE RATES FOR FUEL COSTS
NUCLEAR OUTAGE SCHEDULE THROUGH BILLING PERIOD
JUNE 2017 THROUGH SEPTEMBER 2018

Scheduled nuclear outages lasting one week or more through the Billing Period

Station/Unit	Date of Outage[1]	Explanation of Outage

REDACTED

[1] This exhibit represents DEP's current plan, which is subject to change based on fluctuations in operational and maintenance requirements.